

## Index to Volume XXI, 1921

# SCHOOL SCIENCE AND MATHEMATICS

A Journal for All Science and Mathematics Teachers

*Founded by C. E. Linebarger*

---

SMITH & TURTON, Publishers  
Publication Office, Mount Morris, Illinois  
CHICAGO OFFICE, 2059 East 72nd Place, CHICAGO, ILL.

---

CHARLES H. SMITH  
EDITOR  
Hyde Park High School, Chicago

CHARLES M. TURTON  
BUSINESS MANAGER  
Bowen High School, Chicago

---

### DEPARTMENTAL EDITORS

Agriculture—Aretas W. Nolan  
*The University of Illinois, Urbana, Ill.*  
Astronomy—George W. Myers  
*The University of Chicago*  
Biology, Research in—Millard S. Markle  
*The Earlham College, Earlham, Indiana*  
Botany—Worralo Whitney  
*Hyde Park High School, Chicago*  
Chemistry—Frank B. Wade  
*Shortridge High School, Indianapolis, Ind.*  
Chemistry, Research in—B. S. Hopkins  
*The University of Illinois, Urbana, Ill.*  
Geography—William M. Gregory  
*Normal Training School, Cleveland, Ohio*

General Science—Fredric D. Barber  
*State Normal University, Normal, Ill.*  
Mathematics—Herbert E. Cobb  
*Lewis Institute, Chicago*  
Mathematics Problems—Joseph A. Nyberg  
*Hyde Park High School, Chicago*  
Physics—Willis E. Tower  
*Englewood High School, Chicago*  
Physics, Research in—Homer L. Dodge  
*The State University of Oklahoma, at Norman. Representing American Physical Society*  
Science Questions—Franklin T. Jones  
*Warren and Swasey Co., Cleveland, Ohio*  
Zoology—

---

Published Monthly October to June, Inclusive, at Mount Morris, Illinois  
Price, \$2.50 Per Year; 30 Cents Per Copy

---

Entered as second-class matter March 1, 1913, at the Post Office at Mount Morris, Illinois under the Act  
of March 3, 1879

Vo

S  
T

C

Hyde

Agricu

Astron

Biolog

Botan

Chem

Chem

Geogr

Pu

Entere

GENERAL LIBRARY  
JAN 7 1921  
UNIVERSITY OF MICHIGAN

# SCHOOL SCIENCE AND MATHEMATICS

A Journal for All Science and Mathematics Teachers

*Founded by C. E. Linebarger*

SMITH & TURTON, Publishers

Publication Office, Mount Morris, Illinois

CHICAGO OFFICE, 2059 East 72nd Place, CHICAGO, ILL.

CHARLES H. SMITH  
EDITOR  
Hyde Park High School, Chicago

CHARLES M. TURTON  
BUSINESS MANAGER  
Bowen High School, Chicago

## DEPARTMENTAL EDITORS

Agriculture—Aretas W. Nolan  
*The University of Illinois, Urbana, Ill.*

Astronomy—George W. Myers  
*The University of Chicago*

Biology, Research in—Homer C. Sampson  
*The Ohio State University, Columbus*

Botany—Worralo Whitney  
*Hyde Park High School, Chicago*

Chemistry—Frank B. Wade  
*Shortridge High School, Indianapolis, Ind.*

Chemistry, Research in—B. S. Hopkins  
*The University of Illinois, Urbana, Ill.*

Geography—William M. Gregory  
*Normal Training School, Cleveland, Ohio*

General Science—Fredric D. Barber  
*State Normal University, Normal, Ill.*

Mathematics—Herbert E. Cobb  
*Lewis Institute, Chicago*

Mathematics Problems—Joseph A. Nyberg  
*Hyde Park High School, Chicago*

Physics—Willis E. Tower  
*Englewood High School, Chicago*

Physics, Research in—Homer L. Dodge  
*The State University of Oklahoma, at Norman. Representing American Physical Society*

Science Questions—Franklin T. Jones  
*Warren and Swasey Co., Cleveland, Ohio*

Zoology—Harold B. Shinn  
*Schurz High School, Chicago*

Published Monthly October to June, Inclusive, at Mount Morris, Illinois  
Price, \$2.50 Per Year; 30 Cents Per Copy

"McIntosh Lanterns Are Honest Lanterns."

# Lantern Slides of Science

A copy of our Catalogs of science slides was mailed when published to every member of the Central Association. Are you a member? Did you get your copy? Did you keep it?

If not, there is another copy for you if you are interested. Just write us a card and ask for it. No obligation. You'll need it in placing your orders for science slides.



Lanterns from \$36.00 up.  
Opaque and micro projectors,  
slides and accessories.

**McINTOSH STEREOPTICON  
COMPANY**  
410 Atlas Block, CHICAGO, ILL.

# VIVIAN'S EVERYDAY CHEMISTRY

*"The Chemistry of Life—Not of Books"*

---

AMERICAN BOOK COMPANY

New York      Cincinnati      Chicago      Boston      Atlanta

Please mention School Science and Mathematics when answering Advertisements.

## INDEX BY TITLES.

### A

Achievement of High School and Freshman College Students in Chemistry, The.	S. R. POWERS.....	366
Addenda Wanted.....	194	
Afghanistan. NATIONAL GEOGRAPHIC SOCIETY.....	782	
Agricultural Club Efficiency, Standards for Judging.	W. W. CHARTERS	
and JAMES H. GREENE.....	116	
Alaskan Surveys in Arrears? U. S. GEOL. SURVEY.....	149	
Algebra Failures, Worth-while Work With.	HELEN I. WESTLEY.....	822
Almanac, A Mineral.	U. S. GEOL. SURVEY.....	36
Aluminum, Automobiles and Arkansas.	U. S. GEOL. SURVEY.....	250
Aluminum Production.	U. S. GEOL. SURVEY.....	443
Altitude of Penn. is 1100 Feet, Average.	U. S. GEOL. SURVEY.....	764
Amendment to the Centrals' Constitutions.....	692	
"American" in Teaching Chemistry.	HARRISON HALL.....	859
Areas Below Sea Level.	U. S. GEOL. SURVEY.....	60
Articles in Current Periodicals.....	92, 186, 298, 404, 592, 700, 802	910
Army History.	NATIONAL ACADEMY OF SCIENCES.....	774
Asbestos, Facts About.	U. S. GEOL. SURVEY.....	736
Asphalt Increases, Production of.	U. S. GEOL. SURVEY.....	771
Automobile, An Experiment to Determine the Driving Torque of an.		
H. C. KRENERICK.....	134	

### B

Bacteria, the Ancient.	AMERICAN BOTANIST.....	79
Bacteriology in a Biology Course, A Method of Teaching.	HELEN K. MAXHAM.....	723
Baldwin-Wallace College Science Seminary Mathematics Program.		
O. L. DUSTHEIMER.....	400	
Baird, Grace Jean.....		382
Betelgeuse, A Star Larger than.	SCIENTIFIC AMERICAN.....	892
Big Tree of Tule.	CHARLES J. CHAMBERLAIN.....	715
Biological Sciences to Universal Secondary Education, Contribution of.	OTIS W. CALDWELL.....	103
Biology and Related Sciences in City High Schools, Organization of.		
ALEITA HOPPING.....	463	
Biology by a High School Pupil of Columbus, Ohio, An Experiment in.		
HAZEL LINN.....	558	
Biology in General Science and the Aims to be Attained, Aspects of.		
E. F. VAN BUSKIRK.....	307	
Biology Section, Minutes of the.	ELSA K. HARJES.....	259
Biology, Some Aspects and Problems of High School.	N. M. GRIER.....	444
Books Received.....	96, 194, 296, 402, 508, 600, 706, 804, 912	
Book Reviews.....	100, 196, 404, 508, 602, 708, 806, 914	
American Chemistry.	FRANK B. WADE.....	710
Analytic Geometry.	HERBERT E. COBB.....	918
Animal Husbandry.	CHARLES H. SMITH.....	404
An Introduction to Mathematical Analysis.	HERBERT E. COBB.....	918
An Outline of Physics.	CHARLES H. SMITH.....	602
A Problem Course in Chemistry.	FRANK B. WADE.....	610
A Text Book of Organic Chemistry.	FRANK B. WADE.....	914
Balopticons and Accessories.	CHARLES H. SMITH.....	196
Biological Equipment.	CHARLES H. SMITH.....	604
Business Arithmetic.	HERBERT E. COBB.....	808
Chemical Reactions and their Equations.	FRANK B. WADE.....	914
Chemistry Review Book.	FRANK B. WADE.....	610
Common Science.	CHARLES H. SMITH.....	196
Comrades in Play.	CHARLES H. SMITH.....	710
Die Starre.	HERBERT E. COBB.....	608
Drainage Modifications in the Danbury Region.	CHARLES H. SMITH.....	712
Dynamic Americanism.	CHARLES H. SMITH.....	406

Efficiency Drills in Arithmetic. HERBERT E. COBB	510
Elementary Algebra. HERBERT E. COBB	202
Elementary Applied Mathematics. HERBERT E. COBB	204
Elementary Calculus. HERBERT E. COBB	510
Elementary Electrical Engineering. CHARLES H. SMITH	602
Elementary Functions and Applications. HERBERT E. COBB	102
Elementary Home Economics. CHARLES H. SMITH	408
Elements of Physics. CHARLES H. SMITH	606
Elements of Plane Geometry. HERBERT E. COBB	604
Essentials of Arithmetic. HERBERT E. COBB	606
Factory Chemistry. FRANK B. WADE	608
Geometry Review Book. HERBERT E. COBB	606
Guide to the Mineral Collection in the Illinois State Museum. CHARLES H. SMITH	100
Heredity and Evolution in Plants. WORROLLO WHITNEY	204
Hygiene and Health. WORROLLO WHITNEY	204
Illinois Arbor and Bird Days. CHARLES H. SMITH	604
Introduction to General Chemistry. FRANK B. WADE	510
Junior High School Mathematics. HERBERT E. COBB	808
Laboratory Experiments in Organic Chemistry. FRANK B. WADE	610
Lessons in Heat. CHARLES H. SMITH	200
Lessons in Mechanics. CHARLES H. SMITH	200
Logarithmic and Trigonometric Tables. HERBERT E. COBB	102
Making a High School Program. CHARLES H. SMITH	708
Manual for General Science in the Ninth Grade, Cleveland. CHARLES H. SMITH	714
Modern Junior Mathematics. HERBERT E. COBB	202
Nature Study-Agriculture. CHARLES H. SMITH	714
Pattern Making. CHARLES H. SMITH	712
Parallaxes of 260 Stars. JOSEPH F. MORSE	612
Philosophy and the New Physics. CHARLES H. SMITH	714
Plane and Solid Analytic Geometry. HERBERT E. COBB	916
Plane Geometry. HERBERT E. COBB	608
Plane Trigonometry. HERBERT E. COBB	918
Practical Chemistry. FRANK B. WADE	610
Principles of Human Geography. CHARLES H. SMITH	408
Problems in Botany. WORROLLO WHITNEY	100
Regents' Examination Questions and Answers in Chemistry. CHARLES H. SMITH	196
Regents' Questions and Answers in Physics. CHARLES H. SMITH	196
Regents' Questions and Answers in Physics. CHARLES H. SMITH	708
Rope Work. CHARLES H. SMITH	710
School Arithmetic. HERBERT E. COBB	918
Scientific Instruments and Laboratory Supplies. CHARLES H. SMITH	196
Second Book in Algebra. HERBERT E. COBB	606
Story of the American Red Cross in Italy. CHARLES H. SMITH	198
Studies in Minor Folds. CHARLES H. SMITH	198
Suggestions for Laboratory Exercises in Optics. CHARLES H. SMITH	604
Textbook of Pastoral and Agricultural Botany. WORROLLO WHITNEY	612
The Airplane. CHARLES H. SMITH	198
The American Red Cross in the Great War. CHARLES H. SMITH	508
The Constitution of the United States of America. CHARLES H. SMITH	914
The Derivation and Standardization of a Series of Diagnostic Tests for the Fundamentals of First Year Algebra. HERBERT E. COBB	914
The Elements of High School Mathematics. HERBERT E. COBB	808
The Elements of Theoretical and Descriptive Astronomy. CHARLES H. SMITH	200

The Fundamentals of Argumentation and Debate. CHARLES H. SMITH	602
The Hand Book of America's Private Schools. CHARLES H. SMITH	406
The Passing Legions. CHARLES H. SMITH	198
The Quaternary Geology of the New Haven Region. CHARLES H. SMITH	710
Vocational Arithmetic. HERBERT E. COBB	202
Business and Industry, Relation of Science and Mathematics to. FRED D. BARBER	327
Burma: Land of Pagodas. NATIONAL GEOGRAPHIC SOCIETY	474
Business World Demands of Geography, What the. FRED K. BRANOM	65

C

California Institute of Technology	692
California's Lofty Mountains. U. S. GEOL. SURVEY	790
Central Association. WALTER W. HART	692, 785
Central Association of Science and Mathematics Teachers, The. W. W. HART, President	585
Central Association of Science and Mathematics Teachers: Secretary's Report, Annual Meeting of the. HARRY O. GILLET	255
Central Association, The. CHARLES S. WEBB	596
Chemical Education, Application of Educational Psychology to. NEIL E. GORDON	862
Chemical Education, Section of. NEIL E. GORDON	906
Chemical Reaction, The Theory of the. B. W. PEET	45
Chemistry Adapted to Social Needs. C. M. WIRICK	142
Chemistry, "America" in Teaching. HARRISON HALE	859
Chemistry and Physics Instruction in American High School, The Improvement. EARL R. GLENN	671
Chemistry be Increased, How May Local Interest in. C. E. OSBORNE	128
Chemistry by the Project Method, Teaching. ELLINOR GARDER	454
Chemistry Courses, Report of Committee on the Reorganization of. HERBERT R. SMITH	262
Chemistry, Kinds of	719
Chemistry References for Students and Teachers. EARL R. GLENN	477
Chemistry, Teaching the Fundamentals in. B. S. HOPKINS	122
Chemistry Tests, Results with Standard. B. J. RIVETT	720
Children's Interest in Science Materials, Some Studies of. CHARLES W. FINLEY	1
Classroom Sayings	180, 400, 476, 637
College Education Pays. JOS. L. WRIGHT	242
College Graduates in Chemistry Fitted to Take up Research Problems? If Not, Why Not? Are. H. D. GIBBS	800
College Mathematics, High School and. THOS. E. MASON	37
Committee of Mathematical Requirements, The National	798
Complex to the Simple, From the. JOS. A. NYBERG	343
Content of High School Physics, Report of the Committee on the. C. L. VESTAL	274
Continuation Schools: Should the Teaching be Considered of Elementary or Secondary School Grade. JOHN CROWELL	791
Conventional Examination in Chemistry and Physics, Versus the New Type of Tests: Part. 1, The. EARL R. GLENN	666, 746

D

Diffraction Method for Measurement of Wave Length, An Elementary. J. K. ROBERTSON	377
Diophantine Analysis Applied to the Constructibility of Regular Polygons. M. O. TRIPP	422
Directory of Science and Mathematics Societies	300, 810
Dream Come True, A. WM. A. AUSTIN	621

**E**

Eastern Association of Physics Teachers.....	497
Ecology in the Interpretation of Fossil Faunas, The Value of. FRANK C. BAKER.....	321
Electric Power in the United States. U. S. GEOL. SURVEY.....	688
Electrical Science, The Intellectual Rise in. ROGERS D. RUSK.....	631
Electrolytic Dissociation in High School Chemistry, Teaching of the History of. WM. H. BROWN.....	457
Empirical Relations of One Independent Variable in a Function Containing Four Undetermined Constants, Graphical Solution of. WALTER BARTKY.....	359
Euclid Dramatized. MARGARET GRAFF.....	381

**F**

Factors in the Efficiency of Boys' and Girls' Clubs, A Study of the. W. W. CHARTERS AND JAMES H. GREENE.....	335
Falling Bodies in Ancient and Modern Times. FLORIAN CAJORI.....	638
Film Illustrating Plane Geometry.....	241
Florida Sets New National Records. UNIVERSITY OF FLORIDA.....	427
Foot and Mouth Disease, Should Guard Against. U. S. BUREAU OF AGRICULTURE.....	342
Forestry in the Mississippi Valley. ROBERT B. MILLER.....	73
Formulae in the Junior High School, Teaching. JOS. A. NYBERG.....	409
Fossil Faunas, The Value of Ecology in the Interpretation. FRANK C. BAKER.....	321
Fossils, Study of Early. U. S. GEOL. SURVEY.....	774
Fraud and Mining Ventures. U. S. GEOL. SURVEY.....	736
Function Concept in First Year High School Mathematics, The. J. M. KINNEY.....	541
Fundamentals in Chemistry, Teaching the. B. S. HOPKINS.....	122

**G**

Galvanometer, A Home-Made. CHARLES H. DWIGHT.....	770
General Intelligence, Mathematical Ability as Related to. B. R. BUCKINGHAM.....	205
General Science and the Aims to be Attained, Aspects of Biology in. E. F. VAN BUSKIRK.....	307
General Science in the Junior High School. H. N. GODDARD.....	52
General Science in the State of Washington. A. A. DOUGLASS AND H. N. BAKKE.....	61
General Science in the State of Washington. A. A. DOUGLASS AND H. N. BAKKE.....	315
Geography in American Universities, The Growth of. W. H. WHIT-BECK.....	498
Geography Maps Misleading, School. U. S. GEOL. SURVEY.....	28
Geography Section, Minutes of the. ANNE B. ROYSTON.....	263
Geography Teaching, Some Persistent Errors in. A. E. PARKING.....	598
Geography Texts, Human. W. M. GREGORY.....	577
Geography, The Teaching of Place. DOUGLAS C. RIDGLEY.....	844
Geography, What the Business World Demands of. FRED K. BRANOM.....	65
Geological Survey Needs a Program—Engineering Data Needed. U. S. GEOL. SURVEY.....	254
Geometry Problems, Some Plane. LIDA C. MARTIN.....	765
Geometry, The First Month of. JOS. A. NYBERG.....	29
Gerbert's Letter to Adelbold. G. A. MILLER.....	649
German Threat, Has America No Answer for This. WASHINGTON HERALD.....	500
Graphs, The Teaching of. JOS. A. NYBERG.....	144
Greatest Rivers, The. U. S. GEOL. SURVEY.....	900
Grindstones and Pulpstones. U. S. GEOL. SURVEY.....	690
Gypsum Deposits in the United States. U. S. GEOL. SURVEY.....	194

H	
Heat of Fusion of Ice, Errors in the Determination of the.	PHILO F. HAMMOND
Helium, The Uses of.	SCIENTIFIC AMERICAN
Help the Student Select.	J. E. RUNNING
Highest Elevation on Principal Western Railroads.	U. S. GEOL. SURVEY
High School and College Mathematics.	THOS. E. MASON
High School Library Book Selection from the Viewpoint of a Science Teacher, Past and Present Practice in.	EARL R. GLENN
Historical Element in the Teaching of Secondary Mathematics, The Value and Method of the.	J. T. VALLANDINGHAM
History of Science, Some Observations Concerning the.	E. H. JOHN-SON
Home Economics Section, Minutes of the.	
Horace Mann.	
Human Geography Texts.	W. M. GREGORY
Hydrometer, Test of a Variable Immersion.	PAUL F. GAEHR
I	
Illinois State Academy of Science, Fourteenth Annual Meeting, Carbondale.	A. R. CROOK
Imported Plants.	HENRY C. COWLES
Improvised Science Apparatus.	ALFRED POWERS
Incandescent Lamp in Stereopticons, Use of the.	C. E. EGELER
Inland Empire Teachers Association.	
Insect Pests, Controlling.	U. S. DEPT. OF AGRICULTURE
Interstate Towns.	U. S. GEOL. SURVEY
J	
Junior High School, General Science in the.	H. N. GODDARD
K	
Kater's Pendulum, Two Corrections for.	JOHN B. KREMER
L	
Land and Sea on the Northeastern Coast of Labrador, Relations Between.	GEOGRAPHICAL REVIEW
Lenses and Spherical Aberration, Old.	PHOTO-ERA
Lignite in Alaska, Enormous Reserves of.	U. S. GEOL. SURVEY
Long Island, The Origin of.	U. S. GEOL. SURVEY
M	
Mainsprings in Watches, A Seasonal Breakage of.	S. R. WILLIAMS
Manganese Deposits in Colorado and Wyoming—U. S. GEOL. SURVEY	
Marketing Farm Products Necessary, Efficiency in.	U. S. DEPT. OF AGRICULTURE
Mathematical Ability and Their Prognostic Values, A Discussion of the Rogers Tests.	L. E. MENSENKAMP
Mathematical Ability as Related to General Intelligence.	B. R. BUCKINGHAM
Mathematical Association of America.	G. A. MILLER
Mathematics, Do High School Pupils Dislike?	W. G. GINGERY
Mathematics, Minimum High School.	FLORIAN CAJORI
Mathematics Needed in Freshman Chemistry, The.	LEWIS W. WILLIAMS
Mathematics of the University of Chicago for the Summer Quarter, 1921, Courses in.	
Mathematics Section, Minutes of the.	
Mathematics, with Norms for Judging Them, Class-Exercise Types in High School.	GEORGE W. MYERS
Methods of Teaching in the Class Room, An Experiment in the Use of Three Different.	GEORGE W. HUNTER
Metric System of Weights and Measures as the Single Standard for Weights and Measures, A Bill to Fix the...	
Mineralogy in Elementary Chemistry, The Utility of.	J. NORMAN TAYLOR

Mining In Alaska, Progress of. U. S. GEOL. SURVEY.....	698
Minimum High School Mathematics. FLORIAN CAJORI.....	25
Mississippi River Flow Uphill, Does. U. S. GEOL. SURVEY.....	779
Mississippi Valley, Forestry in the. ROBERT B. MILLER.....	73
Missouri Society. ALFRED DAVIS.....	786
Mongolia National Geographic Society.....	190
Molecule, The Size of a. W. W. SLEATOR.....	511
<b>N</b>	
National Forests Will Aid Alaskan Development. BUREAU OF AGRICULTURE.....	182
National Research Council, Report of the Work of the. JOHN M. COULTER.....	613
Nematodes as Teaching Material, The. ARTHUR C. WALTON.....	565
New England Association of Chemistry Teachers.....	476
New England Association of Chemistry Teachers, The Recon- struction Drive of 1921. S. WALTER HOYT.....	402
Nonparallel Force Problems, A New Method of Attacking. H. E. BROWN.....	529
North Carolina Association. FANNIE S. MITCHELL.....	357
<b>O</b>	
Oil Deficit of Three-Eighths Million Barrels, Daily. U. S. GEOL. SURVEY.....	244
Osmose, On the Nature of the. CREIG S. HOYT.....	856
Ozone in Ventilation, Recent Progress in the Use of. F. O. ANDERECKG.....	245
<b>P</b>	
Paradise, A New. HAROLD B. SHINN.....	238
Parallax Method, Location of Virtual Images by the. PHILIP F. HAMMOND.....	80
Personals.....	700
Petroleum in Alaska. U. S. GEOL. SURVEY.....	764
Phosphate Rock in Montana. U. S. GEOL. SURVEY.....	694
Physics Classes, Report of the Committee on Testing the Achieve- ment of the Teaching Aims in. F. R. GORTON and D. L. RICH.....	273
Physics Courses, Report of Committee on Reorganization of. W. F. ROCKES.....	274
Physics, Research in. HOMER L. DODGE.....	511
Physics Section, Minutes of the. GLENN W. WARNER.....	270
Physics, The Bearing of Recent Research on the Teaching of Ele- mentary. HENRY CREW.....	136
Physics, The Project as a Teaching Unit in High School. B. CLIFFORD HENDRICKS.....	163
Plant Colors in Maize. COLLEGE OF AGRICULTURE, Ithaca.....	781
Plant Life and Human Affairs. CLIFFORD H. FARR.....	847
Platinum Continued Scarce in 1919. U. S. GEOL. SURVEY.....	115
Platinum Production in 1920. U. S. GEOL. SURVEY.....	670
Porcelain Lamp. THE NATIONAL MOTION PICTURE.....	780
Potash from Nebraska Lakes. U. S. GEOL. SURVEY.....	424
Prime Numbers, Note on. G. A. MILLER.....	874
"Principle of Work," According to the Psychological Order, a Plan For Teaching the. CHARLES H. WATSON.....	428
Problem Department. JOS. E. NYBERG.....	83, 173, 280, 384, 483, 582, 676, 787, 894
Process in Factorization, An Extension of a. S. M. KARMAKAR.....	628
Project as a Teaching Unit in High School Physics, The. B. CLIF- FORD HENDRICKS.....	163
Project in Girls' Physics, A. W. A. TIPPIE.....	425
Projects in Heat and Sound, A Few Live. FRANK M. RICH.....	728
Project Teaching in General Science. G. H. TRAFTON.....	315
Proportions in Geometry and Algebra, Teaching. JOS. A. NYBERG	868

Psychological Order, A Plan for Teaching the "Principle of Work"	
According to the. CHARLES H. WATSON	428
Public Schools, Champaign, Ill., The. W. W. EARNEST	215
Q	
Quicksilver Produced in the United States During the Second Quarter of 1920. U. S. GEOL. SURVEY	121
R	
Radium Invisible Even Under the Microscope. U. S. GEOL. SUR- VEY	704
Rain Drops Form, How Do? SCIENTIFIC AMERICAN	72
Reception to the Members of the National Committee on Mathe- matics Requirements for Secondary Schools. REV. W. J. RYAN	696
Red Cross and the Colleges, The. RED CROSS	796
Record Sheet for Science Courses, The. C. H. FARR and R. B. WYLIE	437
Reorganization of Science in the Secondary Schools, Report of Com- mittee on the. OTIS W. CALDWELL and CLARENCE D. KINGSLEY	181
Reorganization of Science in the Secondary Schools of Great Britain and America. EARL R. GLENN	182
Research on the Teaching of Elementary Physics, The Bearing of Recent. HENRY CREW	136
Research in Physics. HOMER L. DODGE	511
Rock Salt, World's Largest Deposit of. U. S. GEOL. SURVEY	688
Rogers Tests, Tests of Mathematical Ability and Their Prognostic Values, A Discussion of the. L. E. MENSENKAMP	150
S	
Science and Mathematics to Business and Industry, Relation of. FRED D. BARBER	327
Science Materials, Some Studies of Children's Interest in. CHARLES W. FINLEY	1
Science Questions. FRANKLIN T. JONES	
88, 177, 284, 392, 488, 588, 680	902
Seasons Changing? Are the. CLARENCE J. ROOT	779
Second-foot of Water, The. U. S. GEOL. SURVEY	756
Senegal: An Advanced Post of African Mohammedanism. NA- TIONAL GEOGRAPHIC SOCIETY	683
Shape of the Earth, Note on the. WM. O. BEAL	473
Size of a Molecule, The. W. W. SLEATOR	511
Snap Exposures on a Tripod. PHOTO-ERA	540
Social Hygiene at Carleton College, An Experiment in. GEORGE W. HUNTER	349
Spherical Aberration, Old Lenses and. PHOTO-ERA	540
Standards for Judging Agricultural Club Efficiency. W. W. CHAR- TERS and JAMES H. GREENE	116
Stereoscopic Projection. PHOTO-ERA	786
Straight Line, How to Draw a. F. E. TRICK	554
Stroboscopic Method of Measuring High Motor Speeds, A. W. H. FARR	525
Students in Chemistry, The Achievement of High School and Fresh- man College. S. R. POWERS	366
T	
Teachers of Mathematics in Missouri, To the. ALFRED DAVIS	781
Teaching First Year Mathematics, An Analysis of an Experiment in. INA E. HOLROYD	757
Teaching of Chemistry, The Application of the Principles of Effi- ciency to the. J. NORMAN TAYLOR	826
Temperature and Precipitation of Alberta, Saskatchewan and Mani- toba, The. GEOGRAPHICAL REVIEW	891
Tempering Copper by the Ancients. U. S. GEOL. SURVEY	719
Text-Book in Beginning Classes in Botany, The Use of the. ARTHUR M. JOHNSON	573
Theme on Transportation, A 1A Girl's.	253

Theory of the Chemical Reaction, The. B. W. PEET.....	45
Tides, An Experiment to Illustrate the Course of the. WM. O. BEAL	379
Topographic and Superpower Surveys. U. S. GEOL. SURVEY.....	675
Treasurer's Report. LEWIS L. HALL.....	257
Tuning Forks, Some New Experiments with. W. H. FARR.....	527
U	
Universal Secondary Education, Contribution of Biological Sciences to. OTIS W. CALDWELL.....	103
V	
Vacuum Pumps, Efficiency Test of the New Cenoco-Hyvac Oil. CHAS. T. KNIPP and C. S. PALMER.....	617
Valency, Teaching. LULA G. WINSTON.....	772
Velocities of Points on a Rolling Wheel, Note on the Comparative. M. H. PEARSON.....	496
Virtual Images by the Parallax Method, Location of. PHILO F. HAMMOND.....	80
W	
Waste for Fuel, Saving. U. S. GEOL. SURVEY.....	143
Winter and Plant Life, Open. MONTHLY WEATHER REVIEW.....	579

## INDEX BY AUTHORS.

A

AMERICAN BOTANIST	79
ANDEREGG, F. O., Purdue University	245
ANNING, NORMAN, Ann Arbor, Mich.	476
AUSTIN, WM. A., High School, Fresno, Calif.	621
<b>B</b>	
BAKER, FRANK COLLINS, University of Illinois	323
BAKKE, H. NOEL, State College of Washington	61
BARBER, FRED D., Illinois State Normal University, Normal, Illinois	327
BAROTZ, N., New York City	84, 280, 485
BARTKY, WALTER, Lewis Institute, Chicago	358
BEAL, WM. O., University of Minnesota	379, 473
BRADOSKI, ALEXANDER	476
BRANOM, FRED K., Chicago Normal College	65
BROPHY, DORIS, Montreal, Canada	388
BROWN, H. E., W. M. Welch Scientific Company, Chicago	529
BROWN, WM. H., High School, Amherst, Mass.	457
BUCHMAN, MAE, Brooklyn Boys' High School Math. Club	281, 284
BUCKINGHAM, B. R., University of Illinois	295
BURLIN, L. R., Warner & Swasey Co., Cleveland, Ohio	292
<b>C</b>	
CADWELL, F. A., St. Paul, Minn.	787, 896
CAJORI, FLORIAN, University of California	25, 638
CALDWELL, OTIS W., Lincoln School, Columbia University	103, 181
CHAMBERLAIN, CHARLES J., University of Chicago	715
CHARTERS, W. W., University of Illinois	116, 335
COBB, HERBERT E., Lewis Institute, Chicago	102, 202, 204, 510, 604, 606, 608, 808, 914, 916, 918
COATS, DOSCOE J., Central High School, Detroit, Mich.	506
COLLEGE OF AGRICULTURE, Ithaca, N. Y.	781
COULTER, JOHN M., University of Chicago	613
COWLES, HENRY C., University of Chicago	560
CREW, HENRY, Northwestern University	136
CROOK, A. R., State Museum, Springfield, Ill.	578
CROWELL, JOHN, South Division Continuation School, Chicago	791
<b>D</b>	
DAVIS, ALFRED, Solden High School, St. Louis	781, 786
DEJARNETTE, W. P., High School, Montgomery, Ala.	486
DICKINSON, MARTIN B., North East High School, Kansas City, Mo.	678
DODGE, HOMER L., University of Oklahoma	511
DOUGLASS, A. A., State College of Washington	61
<b>E</b>	
EARNEST, W. W., Champaign, Ill.	215
EATON, THOMAS E. N., Redlands High School, California	281, 386, 898
EELS, WALTER C., Walla Walla College	788
EGELER, C. E., National Lamp Works, Cleveland	838
<b>F</b>	
FARR, C. H., University of Iowa	437, 847
FARR, W. H., Central Scientific Company, Chicago	525, 527
FINLEY, CHARLES W., Columbia University	1
<b>G</b>	
GARBER, ELLINOR, Shortridge High School, Indianapolis	454
GAEHR, PAUL F., Well College, Aurora, N. Y.	743
GEOGRAPHICAL REVIEW, New York City	891
GIBBS, H. D.	800
GILLET, HARRY O., School of Education, University of Chicago	255
GITHENS, C. E., Wheeling, West Virginia	894
GLENN, EARL R., Lincoln School, Columbia University	217, 477, 666, 671, 746

GINGERY, W. G., Shortridge High School, Indianapolis.....	674
GODDARD, H. N., Supt. of Schools, Chippewa Falls, Wis.....	52
GORDON, NEIL E., University of Maryland.....	862, 906
GORTON, F. R., State Normal School, Ypsilanti, Mich.....	273
GOLDBERG, MICHAL, Philadelphia, Penn.....	281, 390, 789, 898
GRAFF, MARGARET, South Philadelphia High School for Girls.....	381
GREENE, JAMES H., University of Illinois.....	116, 335
GREGORY, W. M., Normal Training School, Cleveland, Ohio.....	577
GRIER, DR. N. M., Washington and Jefferson College.....	444

## H

HALE, HARRISON, University of Arkansas.....	857
HALL, LEWIS L., Morgan Park High School, Chicago.....	257
HAMMOND, PHILO F., University of Wyoming.....	80, 775
HART, WALTER W., University of Wisconsin.....	585, 692
HASSEY, A. B., New Rochelle, N. Y.....	281
HENDRICKS, B. CLIFFORD, University of Nebraska.....	163
HOLROYD, INA E., Kansas State Agricultural College.....	757
HOPKINS, B. S., University of Illinois.....	122
HOPPING, ALEITA, DeWitt Clinton High School, New York City.....	463
HARJES, ELSA K.....	259
HOWARD, F., San Antonio, Texas.....	894
HOYT, CREIG S., Grove City College, Grove City, Pa.....	856
HUNT, MILDRED M., Lewis and Clark High School, Spokane, Wash.....	86
HUNTER, GEORGE W., Knox College, Galesburg, Ill.....	349, 875
HUSSEY, A. B., New Rochelle, N. Y.....	384

## J

JOHNSON, ARTHUR M., University of Minnesota.....	573
JOHNSON, E. H., Kenyon College, Gambier, Ohio.....	450
JONES, FRANKLIN T., Warner and Swasey Co., Cleveland, Ohio.....	88, 177, 284, 392, 488, 588, 680, 902

## K

KARMAKAR, S. M., Nagpur, Central Provinces, India.....	628
KETCHAM, LOIS C., Chester High School, Virginia.....	483
KINGSLEY, CLARENCE D.....	181
KINNEY, J. M., Hyde Park High School, Chicago.....	541
KNIPP, CHAS. T., University of Illinois.....	617
KNOEBEL, IRVIN, High School, Belleville, Ill.....	790
KREANER, JOHN B., Marquette University, Milwaukee.....	836
KRENERICK, H. C., North Division High School, Milwaukee, Wis.....	134

## L

LAZOTT, H. E. A., Nashua, N. H.....	485, 486
LEWIS, FRED A., University, Ala.....	83
LINN, HAZEL, Columbus, Ohio.....	558
LORD, A. H., Classical High School, Lynn, Mass.....	676

## M

MANUFACTURERS RECORD.....	500
MARTIN, LIDA C., High School, Decatur, Ill.....	765
MASON, THOS. E., Purdue University.....	37
MAXHAM, HELEN K., University High School, Eugene, Oregon.....	723
McGREGOR, R. T., Elk Grove, Cal.....	294
McFARLAND, DAVID.....	176
MENSENKAMP, L. E., High School, Freeport, Ill.....	150
MILLER, G. A., University of Illinois.....	418, 649, 874
MILLER, ROBERT B., University of Illinois.....	73
MITCHELL, FANNIE S., Gastonia High School, N. C.....	357
MONTHLY WEATHER REVIEW, Washington, D. C.....	579
MONSKY, MORRIS, Brooklyn Boys' High School.....	678
MYERS, GEORGE W., University of Chicago.....	535

**N**

NATIONAL GEOGRAPHIC SOCIETY, Washington, D. C.	474, 683, 782
NATIONAL MOTION PICTURE, INC., New York City	780
NYBERG, JAS. A., Hyde Park High School, Chicago	
..... 29, 83, 144, 173, 280, 343, 384, 409, 483, 582, 676, 787, 868, 894	

**O**

OSBORNE, C. E., High School, Oak Park, Ill.	128
OTTO, WILLIAM F.	176

**P**

PALL, ABE., Milwaukee State Normal	677
PALMER, C. S., University of Illinois	617
PARKING, A. E., George Peabody College for Teachers	598
PEARSON, M. H., Montgomery, Ala.	496
PEET, B. W., Michigan Normal College, Ypsilanti	45
PHOTO-ERA, Boston, Mass.	534, 540, 786
PICKETT, J., Ranger, Texas	173, 174, 280, 677
POHLMAN, K. L., Cleveland, Ohio	294
POPULAR ASTRONOMY, Northfield, Minn.	365
POWERS, ALFRED, University of Oregon, Eugene	380
POWERS, S. R., University of Arkansas, Fayetteville	366
PRICHARD, R. V., School of Mines, Rolla, Mo.	175

**R**

RAMSEY, WILL W., Perth Amboy, N. J.	174
RED CROSS, Washington, D. C.	796
RICARD, IRENE, Montreal, Canada	390
RICH, D. L., University of Michigan	273
RICH, FRANK M., Principal School 19, Paterson, N. J.	728
RIDGELEY, DOUGLAS C., Illinois Normal University, Normal, Ill.	844
RIVETT, B. J., Northwestern High School, Detroit	720
ROBERTSON, J. K., Queens University, Kingston, Canada	377
ROECKER, W. F., Technical High School for Boys, Milwaukee	274
ROOT, CLARENCE J., Springfield, Ill.	779
ROUSSEAU, GABRIEL, Montreal, Canada	386, 485
ROYSTON, ANNA B., Hyde Park High School, Chicago	263
RUNNING, J. E., High School, Dickinson, N. D.	341
RUSK, ROGERS D., Northwestern College, Naperville, Ill.	631
RYAN, REV. W. J., St. Louis, Mo.	696

**S**

SCIENTIFIC AMERICAN, New York City	72, 81, 892
SENIOR CLASS, Montreal, Canada	485
SHINN, HAROLD B., Schurz High School, Chicago	238
SLEATOR, W. W., University of Michigan	511
SMITH, A. HAVEN, Redlands, Cal.	92
SMITH, CHARLES H., Hyde Park High School, Chicago	
..... 92, 96, 100, 180, 186, 194, 196, 198, 200, 296, 300, 400, 402, 404, 406, 408, 476, 508, 510, 592, 600, 602, 604, 606, 700, 702, 706, 708, 710, 712, 714, 802, 804, 806, 808, 810, 910, 912	914
SMITH, HERBERT R., Lake View High School, Chicago	262
STANLEY, A. B.	192
STEELE, DONALD C., High School, Greensburg, Penna.	384
SWEENEY, FREDERICK L., High School, Mt. Holly, N. J.	174

**T**

TABOR, E., Upper Lake, Calif.	678, 788, 789
TAYLOR, J. NORMAN, Washington Preparatory School	460, 826
TIPPIE, W. A., West Technical High School, Cleveland	425
TRIPP, M. O., University of Maine	422
TROFTON, G. H., Normal School, Mankato, Minn.	315
TUCK, F. E., High School, Nevada City, Calif.	554

**U**

UNIVERSITY OF FLORIDA.....	427
U. S. DEPT. OF AGRICULTURE.....	51, 82, 182
U. S. GEOLOGICAL SURVEY.....	
24, 28, 36, 60, 82, 115, 121, 143, 149, 190, 194, 244, 250, 254, 365, 424, 688, 690, 692, 694, 698, 704, 736, 756, 764, 774, 779, 790, 867, 900	

**V**

VALLANDINGHAM, J. T., Cumberland College, Williamsburg, Ky.....	817
VAN BUSKIRK, E. F., University of Cincinnati.....	307
VESTAL, C. L., Schurz High School, Chicago.....	274

**W**

WAAS, A. M., Philadelphia.....	485
WADE, FRANK B., Shortridge School, Indianapolis, Ind.....	712, 914, 916
WALTON, ARTHUR C., Northwestern College, Naperville, Ill.....	565
WARNER, GLENN W., Englewood High School, Chicago.....	270
WATSON, CHARLES H., University of Kansas.....	428
WEAVER, DEWITT T., Sistersville, Va.....	83, 483
WEBB, CHARLES S., Soldan High School, St. Louis.....	596
WESTLEY, HELEN I., High School, Olean, N. Y.....	822
WHITAKER, HERBERT C., Philadelphia, Pa.....	84
WHITBECK, W. H., University of Wisconsin.....	498
WHITNEY, WORRALO, Hyde Park High School, Chicago.....	100, 204
WILLIAMS, LEWIS W., University of Illinois.....	654
WILLIAMS, S. R., Oberlin College.....	737
WINSTON, LULA G., Meredith College, Raleigh, N. C.....	772
WIRICK, C. M., Crane Junior College, Chicago.....	142
WOOD, HENRY, Corinth, New York.....	483
WRIGHT, JOS. F., University of Illinois.....	242
WYLIE, R. B., University of Iowa.....	437

**Y**

YOUNG, W. Y., Dartmouth College.....	798
--------------------------------------	-----

